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Lowell W. Gresham
Meschkow & Gresham, PLC
Suite 409
5727 North Seventh Street
Phoenix, AZ 85014

EXAMINER	
BAYARD, EMMANUEL	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/766,779	MCCALLISTER, RONALD DUANE
	Examiner	Art Unit
	Emmanuel Bayard	2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *21-33* is/are allowed.

6)☐ Claim(s) *1-16,34-36 and 41-45* is/are rejected.

7)☒ Claim(s) *17-20 and 37-40* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-16, 34-36 and 41-45 are rejected under 35 U.S.C. 102(e) as being anticipated by Cova et al U.S. Patent No 2005/0157814 A1.

As per claim 1, Cova et al teaches a digital predistortion circuit for compensating nonlinear distortion introduced by analog-transmitter components of a digital communications transmitter, said predistortion circuit comprising (see abstract and figs. 1 and 4): a source of a complex-forward-data stream configured to digitally convey information (see fig.1 elements 400, 402 and page 7 [0053]); a DPD controller is the same as the claimed (basis-function generator) coupled to said complex- forward-data-stream source and configured to generate a complex-basis-function-data stream in response to said complex- forward-data stream (see fig.4 element 420 and page 7 [0053] and page 8); a filter coupled to said basis-function generator and configured to generate a complex-filtered-basis-function-data stream in response to said complex-basis-function-data stream (see fig.4 element 108 and page 2 [0010-0012]); and a combination circuit for combining said complex-filtered- basis-function-data stream and

said complex-forward-data stream to compensate for said nonlinear distortion (see fig.4 elements 408, 410 and page 5 [0034] and page 7 [0053]).

As per claim 2, Cova et al inherently teaches wherein said filter is an equalizer defined by filter coefficients (see [0011-0014]).

As per claim 3, Cova et al inherently teaches additionally comprising a feedback section adapted to receive a feedback signal from said analog-transmitter components and to generate a return-data stream, said feedback section being coupled to said equalizer so that said filter coefficients are responsive to said return-data stream (see fig.4 and page [0004-0005] and [0052]).

As per claim 4, Cova et al inherently teaches wherein: said complex-forward-data stream exhibits a forward resolution; and said return-data stream exhibits a return resolution less than said forward resolution.

As per claim 5, Cova et al inherently teaches additionally comprising a programmable delay element coupled between said basis-function generator and said feedback section, said programmable delay element being configured to produce a delayed-complex-forward-data stream temporally aligned with said return-data stream (see fig.9 and page 9 [0008], [0010], [0037], [0042], [0061]).

As per claim 6, Cova et al inherently teaches wherein: said equalizer implements an estimation-and-convergence algorithm to determine said filter coefficients; said estimation-and-convergence algorithm is responsive to said complex-basis-function-data stream and to said return-data stream; said complex-forward-data stream and said return-data stream exhibit forward-error and return-error levels,

respectively, with said return-error level being greater than said forward-error level; and said estimation-and-convergence algorithm is configured to transform increased algorithmic processing time into reduced effective-error level for said return-data stream (see fig.4 and [0053], [0058]).

As per claim 7, Cova et al inherently teaches wherein said equalizer implements an estimation-and-convergence algorithm to determine said filter coefficients (see [0011-0014], [0058]).

As per claim 8, Cova et al inherently teaches wherein: said equalizer is a non-adaptive equalizer configured to be programmed with said filter coefficients; and said predistortion circuit additionally comprises an adaptation engine selectively coupled to said non-adaptive equalizer and configured to implement an estimation-and-convergence algorithm which determines said filter coefficients (see figs.3-4).

As per claim 9, Cova et al inherently teaches additionally comprising a controller coupled to said non- adaptive equalizer and to said adaptation engine, said controller being configured to couple said adaptation engine to said non-adaptive equalizer to determine said filter coefficients and to decouple said adaptation engine from said non-adaptive equalizer (see figs.3-4).

As per claim 10, Cova et al inherently teaches wherein: said non-adaptive equalizer is a complex equalizer having an in-phase path, a quadrature path, an in-phase-to-quadrature path, and a quadrature-to-in-phase path; a first set of said filter coefficients is programmed in said in-phase and quadrature paths, and a second set of said filter coefficients is programmed in said in-phase-to- quadrature and quadrature-to-

in-phase paths; and said adaptation engine accommodates a partial complex equalizer and has first and second paths, said first and second paths being configured in one mode to determine said filter coefficients for said in-phase and quadrature paths, and being configured in another mode to determine said filter coefficients for said in-phase-to-quadrature and quadrature-to-in-phase paths (see figs.3-4).

As per claim 11, Cova et al inherently teaches a predistortion circuit wherein said complex-basis-function-data stream is responsive to X(n)'iX(n) iK, where X(n) represents said complex-forward-data stream, and K is an integer greater than or equal to one (see page 6 [0038-0039]).

As per claim 12, Cova et al inherently teaches wherein said basis-function generator generates a plurality of complex- basis-function-data streams.

As per claim 13, Cova et al inherently teaches wherein: said filter is a first equalizer that processes a first one of said plurality of complex-basis-function-data streams; one or more additional equalizers respectively process other ones of said plurality of complex-basis-function-data streams; and said first equalizer and said one or more additional equalizers couple to said combination circuit (see figs. 3-4).

As per claim 14, Cova et al inherently teaches wherein: said first equalizer and said one or more additional equalizers are non-adaptive equalizers; and said predistortion circuit additionally comprises an adaptation engine selectively coupled to said non-adaptive equalizers, said adaptation engine being configured to implement an estimation-and-convergence algorithm which determines filter coefficients for said non-adaptive equalizers (see figs. 3-4).

As per claim 15, Cova et al inherently teaches wherein: each of said non-adaptive equalizers is a complex equalizer having an in-phase path, a quadrature path, an in- phase-to-quadrature path, and a quadrature-to-in-phase path; for each of said non-adaptive equalizers, a first set of said filter coefficients is programmed in said in-phase and quadrature paths, and a second set of said filter coefficients is programmed in said in-phase-to-quadrature and quadrature-to- in-phase paths; and said adaptation engine accommodates a partial complex equalizer and has first and second paths, said first and second paths being configured in one mode to determine filter coefficients for said in-phase and quadrature paths, and being configured in another mode to determine said filter coefficients for said in-phase-to-quadrature and quadrature-to- in-phase paths (see figs. 3-4).

As per claim 16, Cova et al inherently teaches wherein: said basis-function generator is configured to generate a plurality of substantially orthogonal basis functions; each of said basis functions is responsive to X(n)'iX(n) IK, where X(n) represents said complex-forward-data stream and K is an integer greater than or equal to one; and each of said basis functions produces a complex-basis- function-data stream (see page 6 [0038-0039]).

As per claim 34, Cova et al teaches a method of digitally compensating for nonlinear distortion introduced by analog-transmitter components of a digital communications transmitter, said method comprising: providing a forward-data stream configured to digitally convey information (see fig.1 and 4 elements 400, 402 and page 7 [0053]); generating a basis-function-data stream responsive to X(n)'JX(n) IK, where

X(n) represents said forward-data stream, and K is an integer greater than or equal to one (see fig.4 element 420 and page 7 [0053] and page 6 [0038-0039]); filtering said basis-function-data stream to generate a filtered-basis-function-data stream (see fig.4 element 108 and page 2 [0010-0012]); and combining said filtered-basis-function-data stream and said forward-data stream to compensate for said nonlinear distortion (see fig.4 elements 408, 410 and page 5 [0034] and page 7 [0053]).

As per claim 35, Cova et al inherently teaches wherein said filtering activity filters said basis-function-data stream in a manner determined by filter coefficients, and said method additionally comprises: down-converting a feedback signal obtained from said analog-transmitter components to generate a return-data stream; and processing said return-data stream to generate said filter coefficients (see figs.3-4 and [0011-0014], [0058]).

As per claim 36, Cova et al inherently teaches wherein: said return-data stream exhibits a lower resolution than is exhibited by said forward-data stream; and said return-data stream exhibits a lower resolution than is exhibited by said basis-function-data stream.

As per claim 41, Cova et al inherently teaches wherein: said filtering activity filters said basis-function-data stream in response to filter coefficients; said filtering activity is performed by a programmable digital equalizer section which includes a non-adaptive equalizer selectively coupled to an adaptation engine; and said method additionally comprises coupling said adaptation engine to said non-adaptive equalizer to

determine said filter coefficients, then decoupling said adaptation engine from said non-adaptive equalizer.

As per claim 42, Cova et al inherently teaches wherein: each of said forward-data stream, said basis-function-data stream, and said filtered-basis-function-data stream is a complex-data stream; said non-adaptive equalizer is a complex equalizer having first and second sets of filter coefficients; said adaptation engine accommodates a partial complex equalizer; and as a result of said coupling activity, said adaptation engine identifies said first set of filter coefficients, then after identifying said first set of filter coefficients identifies said second set of filter coefficients.

As per claim 43, Cova et al inherently teaches wherein: said generating activity generates a plurality of basis functions, with each of said basis functions being responsive to X(n)'IX(n) fK, where X(n) represents said forward-data stream and K is an integer greater than or equal to one, and with each of said basis functions producing its own basis-function-data stream; said filtering activity filters each of said plurality of basis-function-data streams to generate a corresponding plurality of filtered-basis-function-data streams; and said combining activity combines said plurality of filtered-basis-function-data streams with said forward-data stream to compensate for said nonlinear distortion (see figs.3-4 and page 6 [0038-0039]).

As per claim 44, Cova et al inherently teaches wherein, for each of said plurality of basis-function-data streams, said filtering activity filters said basis-function-data stream in a manner determined by a filter-coefficient set configured for said basis-function-data stream, and said method additionally comprises: down-converting a

feedback signal obtained from said analog-transmitter components to generate a return-data stream; and processing said return-data stream to sequentially generate said filter-coefficient sets (see figs.3-4).

As per claim 45, Cova et al inherently teaches wherein: said filtering activity is performed by a digital equalizer section which includes a plurality of non-adaptive equalizers and an adaptation engine; and said method additionally comprises sequentially coupling said adaptation engine to each of said non-adaptive equalizers so that said adaptation engine will converge upon one of said filter-coefficient sets, then programming said one of said filter-coefficient sets into a corresponding one of said non- adaptive equalizers, and decoupling said adaptation engine from said corresponding one of said non-adaptive equalizers (see figs.3-4).

Allowable Subject Matter

3. Claims 17-20 and 37-40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. Claims 21-33 are allowed over the prior art of record.

5. The following is a statement of reasons for the indication of allowable subject matter: a heat estimator adapted to receive a signal responsive to said complex-forward-data stream and to generate a heat signal responsive to relative power in said complex-forward-data stream; and said heat estimator couples to said filter so that said heat signal influences said complex-filtered-basis-function- data stream.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Griph et al U.S. Patent No 6,674,808 B1 teaches a post amplifier filter rejection.

Schnabl et al U.S. patent No 5,903611 teaches a method of correcting nonlinearities.

Hsu et al U.S. Patent No 6,794,936 B2.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571 272 3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

10/5/2007

Emmanuel Bayard
Primary Examiner
Art Unit 2611